

Course title: chem.343

Time allowed: 2 hour

Level: 3rd, spring term.

Professor name: dr/El-sayed Abdelrehim.

Date: 23/5/2015.

Marks :(70 marks)

Groups: major chemistry

I) Write short notes on the following:-

- a) Modified polymer.
- b) General properties of polymers.
- c) Molecular forces in polymers.
- d) Types of polymers according to their monomer.
- e) Elongation.

II)

- a) Calculate the degree of polymerization of PVC polymer if the molecular weight of polymer is 23200. (C=12, H= 1, Cl= 35.5).
- b) Find the % of crystallinity for styrene with density 1.25 if the density of complete crystalline polymer is 1.3 and amorphous one is 1.22.

III) Write chemical structure of the following polymers.

- a) Teflon.
- b) PET.
- c) Spandex.

IV) Write the mechanism of the following polymerization:-

- a) Free radical of styrene polymerization.
- b) Cationic polymerization of isobutylene.

Best wishes

Dr/ El-sayed M. Abdelrehim



25/5/2015

Answer the following:

(10 points for each)

1. Define each of the following: dissolved oxygen, chemical oxygen demand and biological oxygen demand.
2. Discuss the importance of atmosphere.
3. Illustrate the main points of phosphorus cycle.
4. By equations, discuss the origin of water alkalinity and water acidity in nature.
5. Give examples for redox reactions mediated by bacteria.
6. Give a brief about: synthetic detergents and poly chlorinated biphenyls.
7. Give examples for the occurrence and effects of cadmium, chromium and mercury.

🔔 GOOD LUCK



Answer the following:

(10 points for each)

1. Give brief account about lanthanide contraction. Why are lanthanides found together in its ore?
2. Discuss two methods used to separate lanthanides.
3. Write the protonic and neutronic configuration of ${}^5_2\text{He}$ and ${}^8_3\text{Li}$.
4. Calculate the atomic weight ${}^{23}_{11}\text{Na}$ given that its nuclear binding energy per nucleon is 7.8934 MeV.
5. What is the function of the cadmium and boron rods in the nuclear reactor?
6. By nuclear equations, state what happen when ${}^{238}_{92}\text{U}$ emits one alpha particle and then two beta particles?
7. Complete the following nuclear reactions:



$\text{amu} = 1/\text{N gram}, 1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}, m_p = 1.007825 \text{ amu}, m_n = 1.008605 \text{ amu}, C = 3 \times 10^{10} \text{ cm/sec}$

GOOD LUCK



24/5/2015

Answer the following:

(10 points for each)

1. By equations discuss the following: Calcination, Roasting, Smelting and Refining.
2. Give the equations representing the chemical treatment of bauxite in Aluminum metallurgy.
3. Matte conversion, or matte smelting, is one of copper metallurgy, what does it mean? Give equations.
4. What is the Portland cement? What are the main steps of its manufacturing?
5. Ammonia is synthesized from natural gas in 6 main steps. What are they?
6. Only by equations how can you obtain urea from ammonia?
7. Hydrochloric acid can be obtained by thermal decomposition of hydrated heavy metal chlorides from spent pickle liquor in metal treatment and from incineration of chlorinated organic waste. Illustrate this statement by equations.

🔔 GOOD LUCK

Answer the following Questions:

Question No1.

- A. Specify the different types of fuels***
- B. Specify the different types of fuel combustion***
- C. Select the correct answer for each of the following***

The used fuel in thermal Power Station is

- (1) Fossil fuel.*
- (2) Nuclear fuel.*
- (3) Geothermal energy.*
- (4) Solar energy*

Question No2.

(A) Discuss the origin and the different methods of production the Biodiesel

(B) Discuss only one of the following power stations:

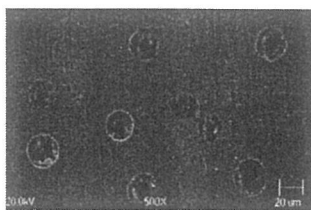
- 1. Thermal power station*
- 2. Hydroelectric power station*
- 3. Nuclear power station*

BEST WISHES

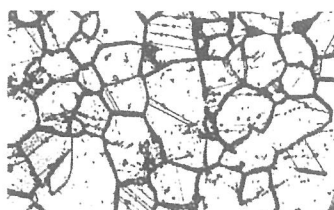


Answer the following questions:-

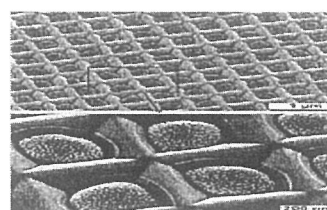
- 1.- Write in brief about corrosion of metals and alloys, and discuss different five forms of corrosion.
2. - What are the expected cathodic and anodic reactions that could take place during the corrosion process?
3. Write in brief about the different methods used for corrosion prevention (protection) of metals and alloys by:
 - (a) Modifying the surface (two methods).
 - (b) Controlling the environment (three methods).
- 4- Find out the name of the corrosion form in the following figures:



(1)



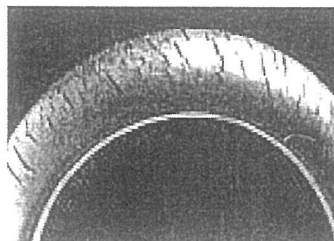
(2)



(3)



(4)



(5)



(6)

With my best wishes

Course title: chem.446

Date: 30/5/2015.

Time allowed: 2 hour

Marks :(70 marks)

Level: 4th, spring term.

Groups: major chemistry

Professor name: dr/El-sayed Abdelrehim.

I) Answer the following:-

- Derive Hammett equation and define each term.
- Explain Hammett equation is not applied on aliphatic compounds or ortho substituted benzoic acid?
- Using the following σ values for substituted benzoic acid.

substituent	σ_{meta}	σ_{para}
CH ₃	-0.07	-0.17
OCH ₃	0.07	-0.24
NO ₂	0.71	0.78

Discuss and explain the inductive and resonance effects.

Show the resonance forms.

- Estimate the p^{ka} of 2, 4, 5-trichlorophenoxy acetic acid, taken that ρ and p^{kaH} of 2- chlorophenoxy acetic acid are 0.30 and 3.05 respectively, while σ_{meta} and σ_{para} of Cl are 0.23 and 0.37 respectively.

e) Draw the chemical structures of the following:-

- bicyclo[4.3.0]nonane.
- spiro[4.3]octane.
- bicyclo[2.2.1]hept-1(2)-ene.

f) Draw all possible conformers of the following:-

- cis 1,2-dimethylcyclohexane.
- trans 1,3-dimethylcyclohexane.

- write short notes on nucleophilic aromatic substitution reaction.

Answer the following questions

Question 1: Write short notes on: (30 marks)

- 1- Wilhelmy plate method for surface tension determination
- 2- Factors affecting c.m.c
- 3- Steps of heterogeneous catalysis
- 4- Spreading of one liquid on another
- 5-Specific acid-catalysis
- 6- Comparison between physical adsorption and chemical adsorption.

Question 2:

(A) Define the following terms: (40 marks)

- 1- Surface tension
- 2- Homogenous catalysis
- 3- Catalyst modifiers
- 4- Lewis acid
- 5- Surfactants

(B) Show with diagram only

- 1- Effect of different alcohols on surface tension
- 2- Effect of surfactant concentration on physical properties of solution,
- 3- Type I and type II adsorption isotherms
- 4- Contributions to an oil-water interfacial tension (with equation)
- 5- Work of adhesion and of cohesion

With my best wishes

Dr/A.F.Hassan

Damanhour University Faculty of Science Chemistry Dept. Course : Chem. 355	Time : 2 h Marks: 70 Level: Three
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Q1: Define the following terms: (10 marks)

- | | |
|--------------------------|--------------------|
| 1-Electrolysis cell | 2-Rate of reaction |
| 3-Autocatalytic reaction | 4-Reversible cell |
| 5-Activation energy | |

Q2: Show with diagram only: (20 marks)

- 1- Potentiometer
- 2- Location of end point in potentiometric titration methods
- 3-Concentration changes in consecutive first order reaction
- 4-Graphical plot for zero order reaction

Q3: Answer the following: (20 marks)

- 1- Enumerate electrodes used in pH determination?
- 2- Write on Quinhydrine electrode?
- 3-Discuss how concentration of chloride ion determine the potential of calomel electrode?
- 4- Compare between order and molecularity?

Q4: Write on the following: (20 marks)

- 1-The kinetics of hydrolysis of an ester in the presence of a mineral acid
- 2-Calculate the potential of Cu electrode when immersed in solution mixture of 0.1 M of CuCl_2 and 0.05 M $\text{Cu}(\text{NO}_3)_2$ at 25°C knowing that $E^\circ(\text{Cu}/\text{Cu}^{+2})$ is 0.034 volt ?

With my best wishes

A.F.Hassan



24/5/2015

Answer the following:

(10 points for each)

1. By equations discuss the following: Calcination, Roasting, Smelting and Refining.
2. Give the equations representing the chemical treatment of bauxite in Aluminum metallurgy.
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🔔 GOOD LUCK



Answer the following questions:-

1. - a) Derive the equation that finds the relation between electrical potential and concentration of ions.

b) Two solutions were mixed and the final solution became containing 1 M/L from each of the following ions: Fe^{++} , Fe^{+++} and Al^{+++} . If an Al electrode was immersed in this solution, show that the following reaction will take place or not:



Where $E^\circ_{\text{Al}/\text{Al}^{+++}} = -1.66 \text{ V}$ & $E^\circ_{\text{Fe}^{++}/\text{Fe}^{+++}} = 0.77 \text{ V}$

2. - a) Explain the use of electromotive force measurements in potentiometric titrations.

b) State right (✓) or wrong (x) and correct the wrong ones:

- 1- The reduced form for any metal will reduce the oxidized form for any element lie after it in the series.
- 2- Galvanic cell consumes electrical energy.
- 3- Cathode is a +ve terminal in electrolytic cell.
- 4- Oxidation process in which the oxidation no. of ion increased.
- 5- Nernst equation is used for stander state condition, to determine the cell potential.
- 6- For the following cell: $\text{Pt} + \text{H}_2 (1\text{atm}) / \text{H}^+ (0.1\text{M}) / \text{H}_2 (0.1\text{atm}) + \text{Pt}$, the cathode will be the electrode with high pressure (1atm).

3. - a) Compare between physical and chemical adsorption.

b) Derive the equation of Langmuir that illustrates the isotherm of localized adsorption.

c) Explain and derive the equation used to determine the surface tension (γ) using Capillary rise method.

With my best wishes

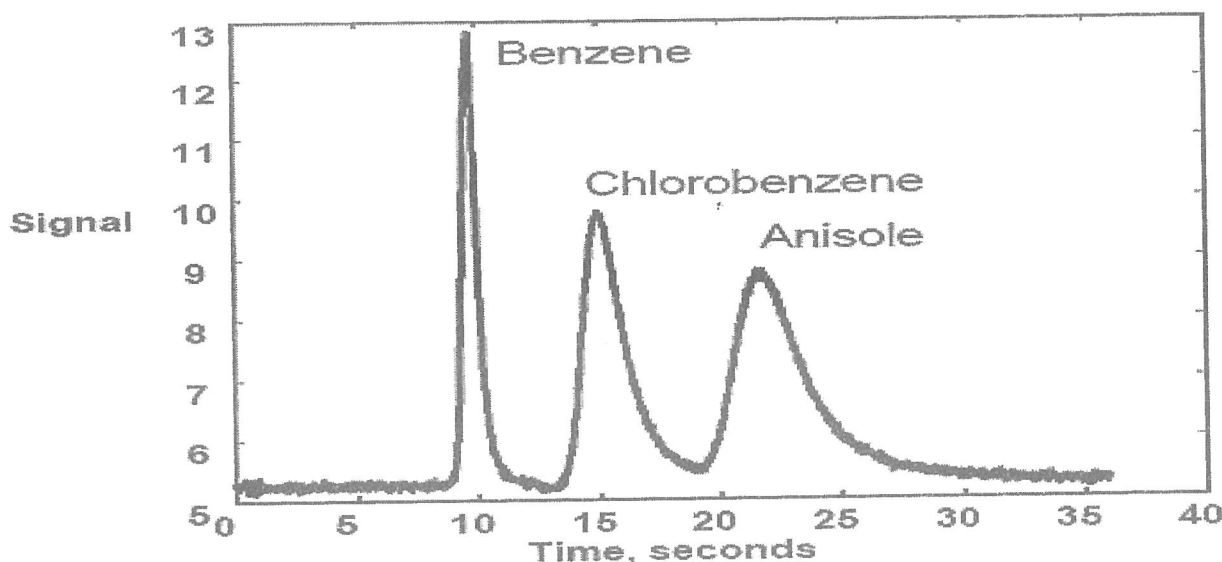
Dr. Emad Matter



26/5/2015

Professor Name: Alaa E. Ali

1. What is meant by "Gross Sample" How can you obtain a liquid sample from a lake?
2. Define K_D and D . Prove the relation between them for benzoic distribution between aqueous and non aqueous solvents. What is the effect of pH on this separation?
3. How can you separate amino acids by anion exchange?
4. A chromatogram of GC is shown below. Calculate the following quantities of interest:



- a- The retention time of benzene.
 - b- The percent of each component in the sample.
5. Draw a complete labeled polarogram of Cd^{2+} reduction by dropping mercury electrode. Define: Diffusion current and Half-wave potential $E_{1/2}$. Show how can they be used in qualitative and quantitative chemical analysis? In an experiment an unknown sample gave diffusion current of 12 amber while the standard sample of 7.2 ppm give id 28 amber, calculate the unknown sample concentration.

GOOD LUCK

Answer the following Questions:

Question No1.

Circle the correct answer for each of the following:

A. The electronic configuration $[\text{Kr}] 5s^2 4d^1$ is the general electronic configuration of:

- (1) First series, 3d-elements.
- (2) Actinide series.
- (3) Lanthanide Series.
- (4) Second series, 4d-elements.

B. The coordination number is

- (1) Guide indicates the number of attached ligands to central metal ion
- (2) Guide indicates the number of central metal ions
- (3) Guide indicates the type of isomerization

C. Ligands could be classified according to

- (1) The number of its donor center that attached with the central metal ion.
- (2) The Coordination Number.
- (3) The type of isomers.

Question No2.

(A) Discuss the following complexes according to the Valence Bond Theory (VBT)

- 1. $\text{K}_2 [\text{Ni} (\text{CN})]_4$
- 2. $\text{K}_3 [\text{CoF}_6]$
- 3. $\text{K}_3 [\text{Co} (\text{CN})_6]$
- 4. $\text{K}_3 [\text{Fe} (\text{CN})_6]$

(B) Discuss the structural isomerism in the coordination compounds

(C) Explain the main difference between high-spin and low-spin of d-orbital according to the crystal field theory (CFT).

BEST WISHES

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BEST WISHES



Course title: chem. 241

Time allowed: 2 hours

Level: 2nd.

Professor name: Dr/El-sayed Abdelrehim.

Date: 31/5/2013

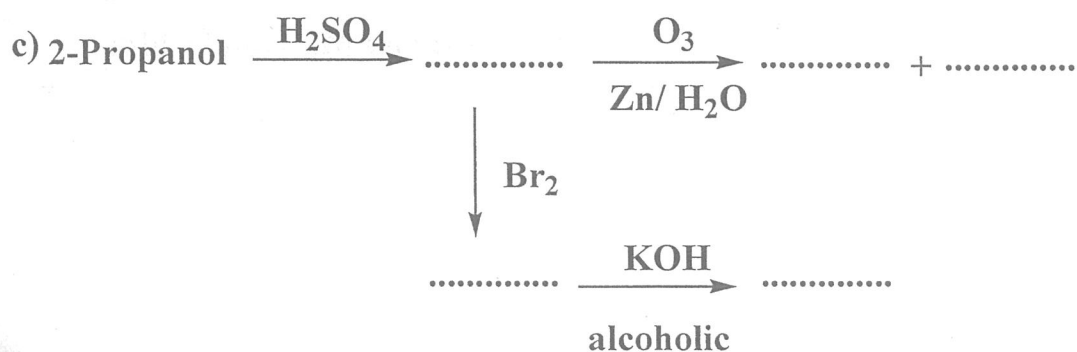
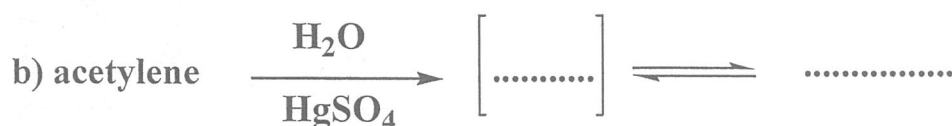
Marks :(70 marks)

Group: major chemistry

I) Draw the chemical structures of the following:- (15 marks).

- a) 3-bromo-2-pentanol.
- b) 4-chloro-2- butenoic acid.
- c) Anisole.
- d) 2,4,6-trinitro toluene
- e) Z-2-pentene.
- f) 3-hexyne.

II) complete the following:- (18 Marks).



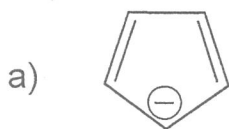
III) Answer the following.

- a) Write the mechanism of benzene nitration.
- b) Arrange the following according to their stabilities.

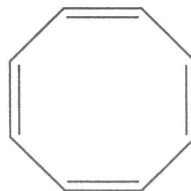
2-Butene, propene, 1-butene, 2, 3-dimethylbutene and ethene.

- c) Starting from ethylene I how to prepare the following:-
- i) Ethanol.
- ii) Acetaldehyde.
- iii) Acetic acid.

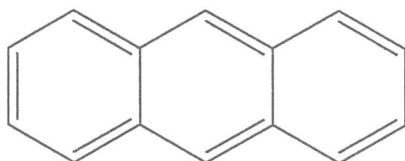
IV) Discuss the aromaticity of the following:- (10 marks).



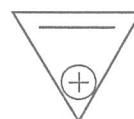
b)



c)



d)



Best wishes

Dr/ El-sayed M. Abdelrehim



Department: Chemistry

Course Title: Org.chemistry

Term: second, 2014/2015

Time Allowed: 2 hours

Professor(s) Name(s): *Mohamed Abd El-Latif*

Section: major chemistry

Course Code: **C242**

Date: 31May 2015

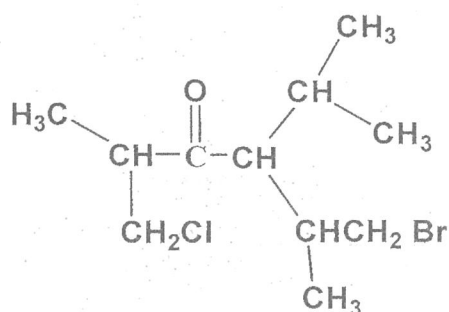
Total points: **70**



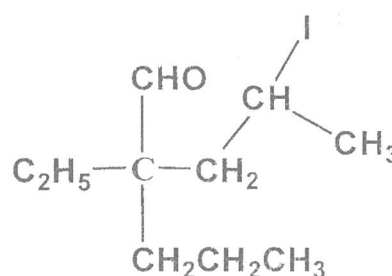
Answer all the following Questions:

Question (1): Give the IUPAC name for:

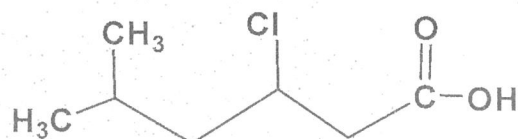
(a)



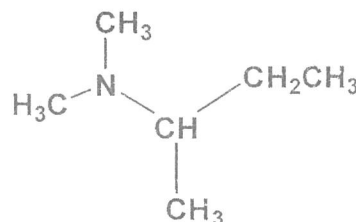
(c)



(b)



(d)



Question (2): Write the chemical equations for:

16 marks

- Aldol-Condensation of propanone
- Haloform of Acetaldehyde.
- Hofmann Degradation of acetamide
- Cannizaro reaction of methanal

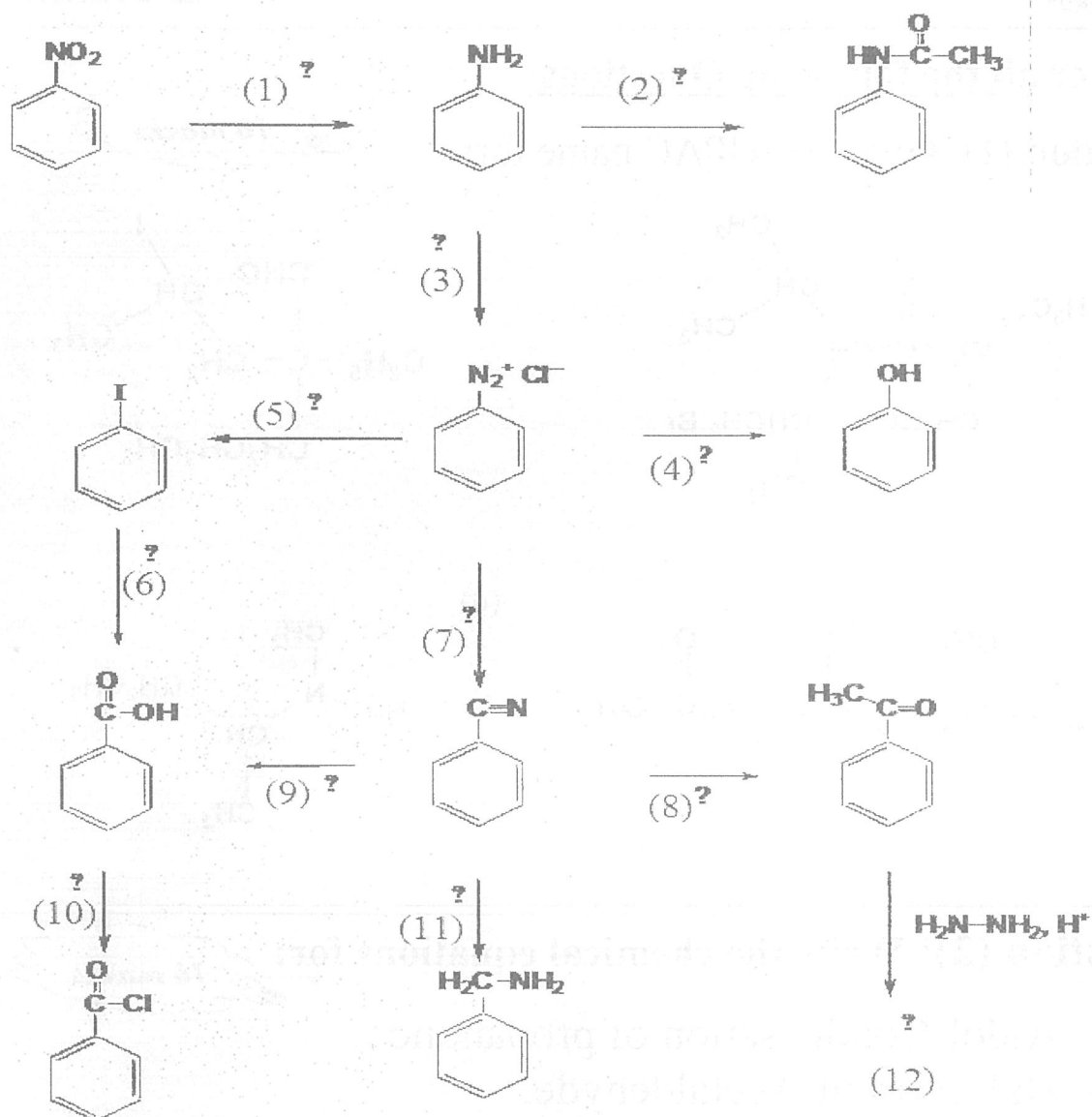
Question (3): How can you convert:

14 marks

- Acetone to acetic anhydride
- Acetaldehyde to ethylamine
- Ethanoic acid to Acetophenone

Question (4): Fill in the blanks of the following Scheme. (There are twelve answers from 1 to 12).

24 marks



With my best wishes

Dr./ Mohamed Abd El-Latif

Answer the following questions:

I- Explain, why? (15 Marks)

- 1- $|\Psi(x,t)|^2 = |\psi(x)|^2$
- 2- Bonding overlap is more stable than antibonding overlap.
- 3- Wave function of a system should be orthonormalized.
- 4- Oppenheimer approximation considers the nucleus as a fixed point in space.
- 5- Electron is neither a particle nor a wave.

II- Molecular orbital theory is applied to predict the formation of molecular wave functions from the overlap between atomic wave functions. **Draw the correlation diagram for H₂ molecule** showing the atomic and molecular orbitals and the type of overlap for each molecular orbital. (8 Marks)

- b) What the bond order stands for? (3 Marks)
- c) Explain the bond between two H atoms. (3 Marks)
- d) Differentiate between σ -overlap and π -overlap. (3 Marks)
- e) Differentiate between atomic and molecular orbitals. (3 Marks)

III- Explain the relation between each of the following: (15 Marks)

- 1- Wave function and its complex conjugate function.
- 2- Shape of electron density and quantum numbers.
- 3- Cartesian coordinates and spherical polar coordinates.
- 4- Classical mechanics and quantum mechanics.
- 5- probability description and probability density.

IV- Write the equation representing the following meaning: (20 Marks)

- 1- Time-independent wave equation.
- 2- Hamiltonian operator equation for a H-atom.
- 3- Eigen value for a particle in one-dimensional box
- 4- Wave function for a particle in box at $n=2$
- 5- Wave function for a system at some position and some time.

Good Luck
Prof.Dr. Mohamed K. Awad

Chem 353

Course Title: Biomolecules
Course code: BC 202
Time Allowed: 2 Hours
Points: 70
Professor Name: Wafaa M. Ibrahim



University: Damanhour
Faculty: Science
Department: Chemistry
Year: Second (Chem-BioChem).
Term: Date: 4/6/2015

Define the following:(15 marks)

1. Carbohydrate.
2. Invert sugar.
3. Rancidity.
4. Iodine number.
5. Diastomer.

Compare between:(20 marks)

- 1- Liver and muscle glycogen-
- 2- Neutral fat and wax.
- 3- Alpha and beta lipoproteins
- 4- Glycoproteins and proteoglycans

Give an account on the following:(20 marks)

- 1- Importance of cholesterol.
- 2- Function of female sex hormones.
- 3- Carbohydrate component of the cell membrane.
- 4- Monosaccharide derivatives

Write the formula of the following:(15 marks)

- 1- Chondroitinesulphate
- 2- Sucrose.
- 3- Platelet activating factor.
- 4- L- fucose.
- 5- isomaltose

GOOD LUCK